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A NEW SPECIES OF HOLOTRICH.

BY NADINE NOWLIN.

(Contribution from the Zoölogical Laboratory, No. 193.)

Two text figures.

IN April of 1909 there was brought to my room at the Naples Station a jar of the small barnacle *Lepas pectinata*, and in examining microscopically one of the appendages I observed a minute rotifer-like animal creeping along its edge. This animal, after being studied for some time, was found to be an infusorian—a Holotrich, resembling in a general way Huxley's *Dysteria armata*. Upon careful study, however, it differed in so many ways that I concluded it to be a distinct form.

Symbiosis is such an old and well known condition in the organic world that any discussion of it for its own sake is unnecessary here. As in other cases, these two animals live together, deriving mutual benefit from the combination; the ciliate finding a shelter in the appendages and the barnacle, no doubt, getting a tasty morsel when it succeeds in dislodging the little animal long enough to sweep it into the gullet. It is a question how the protozoön manages to thrive under these conditions. We know that the water currents set up by the host are swift and frequent, and life under such tempestuous conditions would seem worse even than the chances in the open sea. The structure of the smaller organism partially explains this. It has first of all an armature, a tough siliceous skeleton, covering the body, except a narrow strip on the ventral side. With this protection it is not easily crushed. Then caudally there protrudes a hook-like tail, which not only helps the animal in

creeping over the rough surface of the appendage, but also serves as an efficient means of attachment. Near the oral opening protrudes a long flagellum which lashes rapidly to and fro and secures food for the animal.

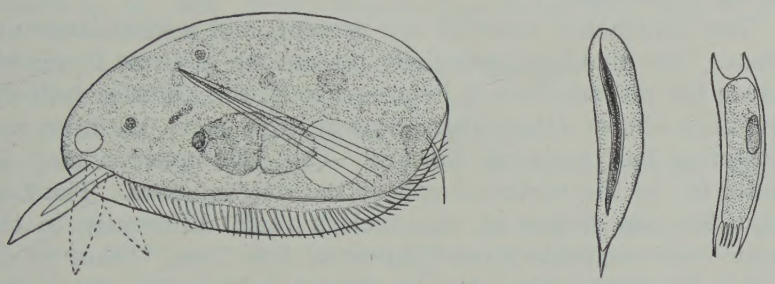
The small visitor thus established on the appendage of a barnacle obtains its food from the currents of water which are constantly coming in to the host. When the dangers come and the appendages are enclosed by the calcareous plates of the barnacle, the ciliate still has moisture and some food. One might think that in casting its lot with a sedentary animal the free-swimming protozoön had limited its opportunities. This is not wholly true. *Lepas pectinata* grows on masses of lava, and during storm these masses become broken and widely scattered. It is only occasionally that the Naples collectors are able to find this barnacle—its appearance in the bay depending upon, first, a storm at sea, and then a strong south wind to sweep it in. During April and part of May I was able to obtain this material but twice. This was unfortunate as the nucleus is an interesting one, and promises well for cytological work. The barnacles live less than a week indoors and the ciliates perish with them. Moreover, the ciliates are not numerous. As a last resort for material, I took barnacles from the storeroom, preserved in formalin, and succeeded in finding the specimens, but they did not prove satisfactory for nuclear study.

DESCRIPTION OF SPECIMEN.

The animal is oval in form, being slightly wider cephalically. It is covered with siliceous skeleton, giving the appearance of a bivalve shell, and possesses a caudal appendage. So different is it from the usual infusor that it is little wonder most zoölogists at first glance pronounce it a rotifer, or a mollusk, or a low crustacean. The animal is flattened dorso-ventrally, the dorsal shell being more extensive and bending over the right side. The dorsal is slightly convex; the ventral is concave and attaches to the dorsal by a deep groove on the left. The right edge of the dorsal shell and the left edge of the ventral do not meet, thus leaving exposed a very narrow strip of protoplasm. This uncovered protoplasm is ciliated and it is by means of these cilia that the animal swims. The surface of both shells is smooth.

The crevice between the ventral and dorsal plate lies then

on the right ventral area of the animal, and because the animal moves often on the edge we are apt to think of this ciliated region as purely ventral. Lankeste in describing the family Dysterina, to which I believe this specimen belongs, calls this the ventral side. The right ventral groove then extends from the posterior end of the animal completely along the side and rounds across the cephalic end. At its caudal extremity is an appendage, and at the cephalic, a long flagellum.



EXPLANATION OF TEXT FIGURES.

The figure to the left is a view of the right dorsal side of the animal, showing the flagellum anteriorly and the ventral cilia; the calcareous supporting rods of the mouth, the two contractile vacuoles and the nucleus. The caudal appendage is shown by a continuous line and its range of motion by dotted lines.

The middle figure is a view of the animal on edge, showing a convex dorsal side, concave ventral, left dorsal groove and caudal appendage.

The right figure is an imaginary cross-section through the nucleus.

The tail, like the body, is covered by the silicious skeleton and appears hollow, at least part of the way. Whether the anus lies at its distal end, as is claimed for *Onychodactylus*, I am unable to say. Its range of movement is nearly 180 degrees in the plane of the right ventral groove. In movement the animal may use this organ as a propeller, shoving itself forward with long strides by placing the end against a solid structure. It is this motion which resembles strongly that of a rotifer. In swimming the tail is usually folded into the groove like a knife-blade closed in its handle, and the animal is carried forward by the vibration of its cilia. The animal when creeping over a solid surface stands on the ciliated edge, much as a mussel when moving through the sand. In swimming it lies slightly on its ventral side and has a swinging motion through the water.

The flagellum is located in a deep depression of the cephalic protoplasm. On superficial examination this depression might

be mistaken for the mouth, but the mouth is just ventral to it and convenient to the currents set up by the flagellum.

The gullet is a long, narrow funnel running obliquely upwards and backwards until it nearly reaches the opposite side of the body. Like other protozoa of this group, it is supported by calcareous rods. These are plainly visible when picro-sulphuric acid is first placed on the specimen, but very soon the acid destroys them and the gullet shows only as a clear place in the protoplasm.

Two contractile vacuoles are present, and a very large nucleus. The nucleus is especially interesting in these forms because the meganucleus is heterogeneous, the anterior half remaining almost clear when stained with picro carmine, the posterior half staining densely. The micronucleus may lie quite far to the posterior end of the meganucleus. The fact that the two halves of the nucleus react differently to the same stain suggests a segregation of functions. Since in division the meganucleus breaks transversely, the resulting animals are dimorphic as to meganuclear protoplasm.

CLASSIFICATION.

According to Lankester's classification the specimen described above belongs to the sub-order Gymnostomata, that division of the Holotrichs in which the mouth is closed in the intervals between the acts of ingesting food. It belongs to the family Dysterinæ (Clap. & Lach.), which corresponds to Calkins's sub-family Ervilinæ: Cilia confined to ventral surface or a portion of it; caudal end invariably possesses a movable style arising from caudo-ventral surface.

Of the various genera grouped under this family, or sub-family, our specimen corresponds most closely to the last of the following list:

Ægyria (Clap. & Lach.), 1858.
Onychodactylus, Entz, 1884.
Trochilia, Duj., 1841.
Dysteria, Huxley, 1857.
Dysteropsis, Roux, 1902.

The only species of this genus, so far as I can learn, is the small one found in the lakes of Geneva and called minuta by Roux, because it measures only 28 micra long and 16 micra wide. The animal described in this paper is marine; the av-

erage specimen is 83 micra long and 50 wide. Its habitat in the tentacles of *Lepas pectinata* suggests the name of *Dysteropsis pectinata* for the new specimen.

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